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If we put n and t each $= 50$, we find $p = \frac{1}{25}$, and $S = 45.38431$. Hence the No. of white marbles in B's bag at the end of the 50th transfers will be at least 4. If we make $S = 25$, we shall find $25p - 1 = (1 - p)^t$, which gives $0 = (1-p)^t$, and $0 = (\frac{24}{25})^t$; but this can only happen when t is infinite. Hence, after an inf. No. of trans. B will find half of A's marbles in his bag.

PROBLEMS.

423. *By E. Millwee, Add-Ran College, Granbury, Texas.*—Given the hypothenuse of a right-angled triangle and the difference of the two lines drawn from the acute ang's to the centre of the ins'd circle, to find the triang.

424 *By Prof. De Volson Wood.*—Required the equation to the locus which is at a constant, internal, normal dist. from the four cusp epicycloid.

425. *Id.*—A cylinder rolls down the upper plane of a wedge, the wedge being upon a perfectly smooth horizontal plane; required the velocity of the cylinder when it shall have rolled a distance l on the plane.

426. *By William Hoover, A. M.*—Eliminate θ from the equations

$$(a+b)\tan(\theta-\varphi) = (a-b)\tan(\theta+\varphi), \qquad (1)$$

$$a\cos 2\varphi + b\cos 2\theta = c. \qquad (2)$$

427. *By Prof. J. W. Nicholson.*—C and D are two fixed points (1 dist. apart) on the line AB; show that the locus of a point P, moving in such a manner that $\angle PDB = n\angle PCB$, the origin being at C, is

$$\frac{y\sqrt{-1}}{x-1} = \frac{(x+y\sqrt{-1})^n-(x-y\sqrt{-1})^n}{(x+y\sqrt{-1})^n+(x-y\sqrt{-1})^n}.$$

PUBLICATIONS RECEIVED.

Signal Service Tables of Rainfall and Temperature Compared with Crop Produc'n [Professional Paper No. X.]. 4to. Washington. 1882.

Parallax of a Lyræ and 61 *Signi.* By ASAPH HALL, Professor of Mathematics, U. S. Navy. 4to. 64 pp. Washington. 1882.

The Theory of the Gas Engine. By DUGALD CLARK. 16mo. 164 pp. New York: D Van Nostrand, Publisher. 1882. Price 50 cts.

The American Engineer, 182–184 Dearborn Street, Chicago, Ill. An illustrated Journal, Scientific and Practical, *Published Weekly.* Sub. Price for U. S. and Canada, $4 per year.

On the Spherical Triangle Proof of the Addition Equation in Elliptic Functions. By Professor WILLIAM WOOLSEY JOHNSON. [Ext. from Q. Jour. of Pure and Ap'd Math., No. 72.]

Systems of Formulæ for the sn, cn, and dn of $u + v + w$. By Prof. W. W. JOHNSON. [Extracted from the Proceedings of the London Math. Soc. Vol. XIII, No. 186.]